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Conference Abstract

Adapting Museum Workflows to Accommodate Omic-based, Multi-species Occurrences from Environmental Samples

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Abstract

Natural history museums play a critical role in curating global anthropological, biological and geological diversity. Museums host more than voucher samples for comparative identification purposes. They host a suite of derived products and associated information, which cascade from these records of diversity in time and space. Increasingly, museums capture whole communities through curation of environmental samples and their derived data. Environmental samples are defined as material samples that yield multi-species occurrence records that cannot be sorted into traditional independent lots and whose membership can only be determined by downstream analytical processes, usually based on the generation of DNA sequence profiles. These materials include samples such as filtered water; feces, gut dissections or gastric lavage; scraped and blended settlement plates; as well as sediment, ice or soil cores. Given the level of ongoing and predicted global change, through the curation of these environmental samples, museums provide time capsules of diversity and longitudinal breadth to examine temporal patterns in phenology, range shifts, species interactions and diversity loss or gain. The future of natural history museums is likely to expand from providing inventory-like services to more observatory functions. They should provide strategic windows to the past by partnering with place-based observatories or targeted regions of predicted change.

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Rather than individual specimens, environmental samples represent entire systems as events, defined by space and time. Thus, these environmental samples are explicitly event-centric. The cascade of derived information, protocols and handling steps, as well as analytical processes and their associated metadata, needs to be tracked via the minting of persistent identifiers at each material sample and derived data step.

Efforts are underway through collaboratively funded programs like the iSamples Cyberinfrastructure group, funded by the US National Science Foundation, to semantically map these various material samples while capturing their parent-child relationships. Moreover, museums, such as the Smithsonian's National Museum of Natural History, are scoping and examining existing systems of record, metadata models and mapping workflows, with particular emphasis on environmental samples. These event-based samples create new challenges for historically taxonomically-siloed departments pertaining to custodianship, permitting, versioning of biodiversity occurrence records based on improved reference libraries, and future use and reuse of these material samples. Management systems are being augmented or adopted to encompass these new workflows to ensure that today's samples can support tomorrow's science in service to a sustainable future.

Keywords

material samples, event-based

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